Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the above-identified application:

Listing of Claims

1. (Currently Amended) An autonomous mooring device comprising:

~~a combination air brake/anchor comprising a plurality of mooring arms and a parachute attached to the plurality of mooring arms;~~

~~a mooring module attached to the air brake/anchor; and~~

~~a floatation buoy attached to an end of the mooring line.~~

an anchor comprising a plurality of mooring arms rotatably coupled to a body of the anchor and biased to extend radially outward upon deployment from a deployment chamber above a bottom and wherein the autonomous is separated from the deployment chamber upon deployment;

a mooring line module including the at least one mooring line coupling the mooring line module to the anchor;

wherein the body of the anchor is coupled in close proximity to the mooring line module such that the plurality of arms may be rotated into a position in which the autonomous mooring device, including the plurality of arms, may be stored in the

deployment chamber and upon release from the deployment chamber above the bottom, rotate the mooring arms into a position such that the arms extend radially;

a release mechanism in communication with the anchor, wherein the release mechanism is configured to release the anchor from attachment in close proximity to the mooring line module upon contact with a water surface, whereby the anchor remains in contact with the mooring line module via at least one mooring line;

a flexible parachute coupled to the plurality of arms and extending between the arms at least partially circumferentially around the anchor to form a parachute usable to reduce the velocity of the autonomous mooring device after being dropped in air above a water body; and

a buoy in communication with the mooring line module.

2. (Currently Amended) The mooring device of claim 1, wherein the mooring device is operable between a plurality of operational states comprising:

a first operational state wherein the ~~air brake/~~anchor is in a ~~compact,~~ stowed position, and the ~~air brake/~~anchor, the mooring line module and the ~~flotation~~ buoy in a deflated state, are capable of being contained within a cylinder;

a second operational state wherein the ~~air brake/~~anchor, the mooring module and the buoy are deployed from the cylinder, the ~~air brake/~~anchor, mooring line module and buoy are

all rigidly attached, and the ~~air brake/~~anchor is in an expanded operational position to effectuate air braking; and

a third operational state wherein the ~~air brake/~~anchor, mooring module and buoy are deployed, further wherein the buoy is attached to the mooring module ~~using~~ including a first cable and the mooring module is attached to the ~~air brake/~~anchor ~~using~~ including a second cable, and the buoy is inflated to be buoyant.

3. (Currently Amended) The mooring device of Claim 1, wherein each of the mooring arms comprise a plurality of linked arm segments, the mooring arms being foldable at joints of the linked arm segments to enable the ~~air brake/~~anchor to be folded into a ~~compact,~~ stowed position.

4. (Currently Amended) The mooring device of Claim 3, wherein the mooring arms further comprise springs connected to adjacently positioned linked arm segments to facilitate deploying the ~~air brake/~~anchor from the ~~compact,~~ stowed position to an expanded, deployed position.

5. (Currently Amended) The mooring device of Claim 1, ~~wherein the mooring line comprises a structural member~~ further comprising a stabilization device coupled to the buoy.

6. (Currently Amended) The mooring device of Claim 1 ~~5~~, ~~wherein the mooring line includes at least one conductor~~ further comprising an ejection guide to guide the mooring device from the deployment chamber during deployment.

7. (Currently Amended) The mooring device of Claim 1, ~~wherein the parachute is attached to at least an end of a plurality of the mooring arms and a structure of the parachute in a deployed position is defined generally by a structure of the plurality of mooring arms in an extended position~~.
wherein the buoy has a ratio of length to width of greater than about 2:1 thereby reducing drag on the buoy when placed in a body of water.

8. (Currently Amended) The mooring device of Claim 1, ~~wherein the mooring line is contained within a mooring line module~~ wherein the buoy has a lateral cross-section with a shape such that when the buoy is inflated with a gas, a higher percentage of the gas is in an upper half of the buoy and a lower percentage of the gas in a lower half of the buoy.

9. (Currently Amended) The mooring device of Claim 8, wherein the mooring line module further comprises:

a mooring line spool [[;]] positioned in a module housing[[;]] wherein a mooring line is wound on the mooring line spool;

a line feed disk proximate to the mooring line spool; and

a line locking mechanism configured to control release of the mooring line from the mooring line spool,

wherein the ~~mooing~~ mooring line is ~~fed out~~ released from the mooring line spool through the line feed disk.

10. (Currently Amended) The mooring device of Claim 9, wherein the mooring line module further comprises ~~an electronics system, the electronics system~~ a mooring line release system comprising:

a magnet coupled to the line feed disk; and

a hall sensor;

wherein the line feed rotates as the mooring line is released from the mooring line module, and the hall sensor is ~~used~~ configured to detect each rotation to determine an amount of the mooring line which is released.

11. (Currently Amended) The mooring device of Claim 9, wherein the mooring line module further comprises ~~an electronics system, the electronics system~~ a mooring line release system comprising:

a pressure sensor[[;]] usable to determine

~~wherein the pressure sensor provides a measure of~~ depth of the mooring line module within a fluid.

12. (Withdrawn) An anchor comprising:

a plurality of mooring arms;

wherein the plurality of mooring arms comprise a plurality of linked arm segments, the mooring arms being foldable at joints of the linked arm segments to enable the anchor to be folded into a compact, stowed position.

13. (Withdrawn) The anchor of Claim 12, wherein the mooring arms further comprise springs connected to adjacently positioned linked arm segments to facilitate deploying the anchor from the compact, stowed position to an expanded, deployed position.

14. (Withdrawn) A combination anchor/air brake comprising:

a plurality of mooring arms; and

a parachute attached to at least an end of a plurality of the mooring arms;

wherein the plurality of mooring arms comprise a plurality of linked arm segments, the mooring arms being foldable at joints of the linked arm segments to enable the anchor to be folded into a compact, stowed position;

further wherein a structure of the parachute in a deployed position is defined generally by a structure of the plurality of mooring arms in an extended position.

15. (Withdrawn) The anchor of Claim 14, wherein the mooring arms further comprise springs connected to adjacently positioned linked arm segments to facilitate deploying the anchor from the compact, stowed position to an expanded, deployed position.

16. (Withdrawn) A mooring line module comprising:

a mooring line spool;

a module housing;

a mooring line;

a line feed disk; and

a line locking mechanism,

wherein the mooing line is fed out from the mooring line spool through the line feed disk.

17. (Withdrawn) The module of Claim 16, wherein the mooring line module further comprises an electronics system, the electronics system comprising:

a magnet coupled to the line feed disk; and

a hall sensor;

wherein the line feed rotates as the mooring line is released from the mooring line module, and the hall sensor is used to detect each rotation to determine an amount of the mooring line which is released.

18. (Withdrawn) The module of Claim 16, wherein the mooring line module further comprises an electronics system, the electronics system comprising:

a pressure sensor;

wherein the pressure sensor provides a measure of depth of the mooring line module within a fluid.

19. (Withdrawn) A flotation buoy comprising:

a buoy;

wherein the buoy has a ratio of length to width of greater than about 2:1 thereby reducing drag on the buoy when placed in a body of water.

20. (Withdrawn) The flotation buoy of Claim 19, wherein the buoy has a shaped lateral cross-section such that, when the buoy is inflated with an inflation gas, a higher percentage of the inflation gas is in an upper half of the buoy and a lower percentage of the inflation gas in a lower half of the buoy.

21. (Withdrawn) The flotation buoy of Claim 19, further comprising a stabilization means attached to the buoy to provide additional stability of the buoy in currents.

22. (Withdrawn) The flotation buoy of Claim 19, wherein the buoy has a reduced drag that is less than about 35% of a drag for a buoy having a circular cross-section.

23. (Withdrawn) A release mechanism for releasing an anchor attached to another device comprising:

a mooring release for releasing the anchor from the other device; and

release means for activating the mooring release upon contact with water.

24. (Withdrawn) The release mechanism of Claim 23, wherein the release means comprises at least one chemical pill that dissolves in contact with water.

25. (Withdrawn) The release mechanism of Claim 23, further comprising a compression ejection spring to help release the anchor from the other device.

26. (New) The mooring device of Claim 1, wherein the release mechanism for releasing an anchor comprises at least one chemical pill that dissolves in contact with water.

27. (New) The mooring device of Claim 1, further comprising a compression ejection spring positioned in the deployment chamber to expel the payload autonomous mooring system from deployment chamber.

28. (New) The mooring device of claim 1, further comprising an inflation system for inflating the buoy.

29. (New) An autonomous mooring device comprising:

an anchor comprising a plurality of mooring arms rotatably coupled to a body of the anchor and biased to extend radially outward upon deployment from a deployment chamber above a bottom, wherein each of the mooring arms comprise a plurality of spring biased, linked arm segments, the mooring arms being foldable at joints of the linked arm segments to enable the anchor to be folded into a stowed position and wherein the autonomous is separated from the deployment chamber upon deployment;

a mooring line module including the mooring line coupling the mooring line module to the anchor and a mooring line release system configured to periodically determine whether an amount of mooring line extending from the mooring line module should be adjusted to keep the anchor in contact with a sea floor;

wherein the body of the anchor is coupled in close proximity to the mooring line module such that the plurality of arms may be rotated into a position in which the

autonomous mooring device, including the plurality of arms, may be stored in the deployment chamber and upon release from the deployment chamber above the bottom, rotate the mooring arms into a position such that the arms extend radially;

a release mechanism in communication with the anchor, wherein the release mechanism is configured to release the anchor from attachment in close proximity to the mooring line module upon contact with a water surface, whereby the anchor remains in contact with the mooring line module via a mooring line;

a flexible parachute coupled to the segments of the plurality of arms and extending between the arms at least partially circumferentially around the mooring line module to form a parachute usable to reduce the velocity of the autonomous mooring device after being dropped in air above a water body and wherein the flexible parachute is capable of remaining attached to the arm segments when the arm segments are rotated relative to each other to be placed into the stowed position; and

a buoy in communication with the mooring line module via buoy line.

30. (New) The mooring device of claim 29, wherein the mooring device is operable between a plurality of operational states comprising:

a first operational state wherein the anchor is in a stowed position, and the anchor, the mooring line module and the buoy in a deflated state, are contained within the deployment chamber, which is a cylinder;

a second operational state wherein the anchor, the mooring module and the buoy are deployed from the cylinder, the anchor, mooring line module and buoy are all rigidly attached, and the anchor is in an expanded operational position to effectuate air braking; and

a third operational state wherein the anchor, mooring module and buoy are deployed, further wherein the buoy is attached to the mooring module including a first cable and the mooring module is attached to the anchor including a second cable, and the buoy is inflated to be buoyant.

31. (New) The mooring device of Claim 29, further comprising a stabilization device coupled to the buoy.

32. (New) The mooring device of Claim 29, further comprising an ejection guide configured to guide the mooring device from the deployment chamber during deployment.

33. (New) The mooring device of Claim 29, wherein the buoy has a ratio of length to width of greater than about 2:1 thereby reducing drag on the buoy when placed in a body of water.

34. (New) The mooring device of Claim 29, wherein the buoy has a lateral cross-section with a shape such that when the buoy is inflated with a gas, a higher percentage of the gas is in an upper half of the buoy and a lower percentage of the gas in a lower half of the buoy.

35. (New) The mooring device of Claim 29, wherein the mooring line module further comprises a mooring line spool positioned in a module housing wherein a mooring line is wound on the mooring line disk; a line feed disk in communication with the mooring line spool; and a line locking mechanism configured to control release of the mooring line from the mooring line spool, wherein the mooring line is released from the mooring line spool through the line feed disk.

36. (New) The mooring device of Claim 29, wherein the mooring line release system comprises magnet coupled to a line feed disk and a hall sensor, wherein the line feed disk rotates as the mooring line is released from the mooring line module, and the hall sensor is configured to detect each rotation to determine an amount of the mooring line which is released.

37. (New) The mooring device of Claim 29, wherein the mooring line release system comprises a pressure sensor configured to provide a measure of depth of the mooring line module within a fluid.

38. (New) The mooring device of Claim 29, wherein the release mechanism for releasing an anchor comprises at least one chemical pill that dissolves when in contact with water.

39. (New) The mooring device of Claim 29, further comprising a compression ejection spring positioned in the deployment chamber to expel the payload autonomous mooring system from deployment chamber.